

OCCUPATIONAL SCALES OF THE NAVY VOCATIONAL INTEREST
INVENTORY: II. RELIABILITY

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20. ABSTRACT (continued)

in 15 specific Navy ratings. The scales yield scores known as lambda coefficients, which are based upon a modification of the point-biserial correlation between the individual's NVII responses and responses of men in each of the 15 ratings (Clemans, 1958).

The present study evaluated the test-retest reliability of profiles of scores based upon these lambda scales for 179 reenlistees and 136 non-reenlistees. The men were first tested in 1964 or 1965 prior to entering one of seven class "A" schools and were retested four to six years later. Information on the scales' internal consistency reliability was also obtained using a representative sample of Navy recruits.

Median test-retest correlations, where Spearman's rank-difference method was used to compute the relationship between the ranks of scores on each individual's test and retest profiles, were .87 for reenlistees and .85 for nonreenlistees. The median internal consistency reliability for the 15 scales was .96.

Based on these results, lambda scales of the NVII are considered sufficiently stable for use in recruit classification.

However, the scales' ability to differentiate between individuals in different ratings and to predict such criteria as job satisfaction must be evaluated using currently available data before the scales can be recommended for operational use.

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SUMMARY

Problem

Each year thousands of enlisted recruits enter the Navy and, with little or no Navy experience, must indicate the rating they would like to pursue for most of their military careers. The Navy Vocational Interest Inventory (NVII) was developed to help these recruits determine the ratings corresponding most closely with their vocational preferences and in which they would probably be most satisfied. The inventory could thus benefit the Navy in terms of more efficient utilization of manpower and, by enhancing the individual's job satisfaction, could increase his chances of reenlisting or electing a Navy career.

Background

Recently, as part of a long-range project aimed at updating the NVII, 15 occupational scales were built to reflect the degree of relationship between an individual's interests and the interests of men in 15 specific Navy ratings. The scales yield scores known as lambda coefficients, which are based upon a modification of the point-biserial correlation between the individual's NVII responses and responses of men in each of the 15 ratings (Clemans, 1958).

An individual's scores on these lambda scales must remain stable over long time periods if the scales are to be useful in recruit classification. The objective of this research is to evaluate the stability of the lambda scales over four to six years and to estimate the scales' internal consistency reliability.

Approach

To determine the test-retest reliability of the lambda scales, 1,009 men were located who had completed NVIIs in 1964 or 1965 prior to training in one of seven Navy schools. One hundred seventy-nine of these individuals who reenlisted completed retest NVIIs in 1969, and 136 who did not reenlist completed such NVIIs in 1970.

Each individual's test and retest NVIIs were scored, and the 15 scores of each profile were rank-ordered. Spearman rank-difference correlations were computed between each individual's test and retest profiles, and separate distributions of correlations were determined for reenlistees and nonreenlistees.

To estimate the internal consistency reliability of the NVII, the odd-even method was used with 528 recruits.

Findings and Conclusions

The median test-retest correlations among reenlistees and non-reenlistees were .87 and .85, respectively, and indicate the 15 lambda scales to be sufficiently stable for use in recruit classification.

The internal consistency reliabilities ranged from .88 to .97, with a median of .96, and indicate high internal consistency for the scales.

Before the scales are recommended for operational use, however, information currently available on their ability to differentiate between men in different ratings and to predict such criteria as job satisfaction must be fully evaluated.

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OCCUPATIONAL SCALES OF THE NAVY VOCATIONAL INTEREST
INVENTORY: II. RELIABILITY

BACKGROUND AND PURPOSE

The Navy Vocational Interest Inventory (NVII) was developed during the 1950's to help guide Navy enlisted recruits into ratings which were consistent with their vocational preferences and in which their chances of job satisfaction would be high (Clark, 1961).

Nineteen occupational and nine area scales were constructed (Clark, 1961) and, in recent studies, were found to differentiate well among men in different Navy class "A" schools (Abrahams, Lau, & Neumann, 1968; Lau & Abrahams, 1969) and to predict such criteria as "A" school achievement (Abrahams, Lau, & Neumann, 1968; Lau & Abrahams, 1969) and reenlistment (Lau, Lacey, & Abrahams, 1969). The scales also showed substantial test-retest reliabilities over four to six years for reenlistees (Lau & Abrahams, 1970) and nonreenlistees (Lau & Abrahams, 1971).

Abrahams, N. M., Lau, A. W., & Neumann, I. An analysis of the Navy Vocational Interest Inventory as a predictor of school performance and rating assignment. San Diego: U. S. Naval Personnel Research Activity, October 1968. (Research Report SRR 69-11)

Clark, K. E. The vocational interests of nonprofessional men. Minneapolis: University of Minnesota Press, 1961.

Lau, A. W., Lacey, L. A., & Abrahams, N. M. An analysis of the Navy Vocational Interest Inventory as a predictor of career motivation. San Diego: U. S. Naval Personnel Research Activity, June 1969. (Research Report SRR 69-27)

Lau, A. W., & Abrahams, N. M. Area scales of the Navy Vocational Interest Inventory as predictors of school performance and rating assignment. San Diego: U. S. Naval Personnel Research Activity, July 1969. (Research Report SRR 70-1)

Lau, A. W., & Abrahams, N. M. The stability of scores on the Navy Vocational Interest Inventory. San Diego: Naval Personnel and Training Research Laboratory, March 1970. (Research Report SRR 70-17)

Lau, A. W., & Abrahams, N. M. Reliability and predictive validity of the Navy Vocational Interest Inventory. San Diego: Naval Personnel and Training Research Laboratory, February 1971. (Research Report SRR 71-16)

Based upon these favorable results, a large-scale effort was undertaken in 1971 to develop new interest scales for a larger number of ratings using more current samples of enlisted men. These newer scales, now available for 15 ratings, yield scores indicating the degree of relationship between an individual's interests and those of men in the 15 ratings. The scores are referred to as lambda coefficients (Clemans, 1958) and are based upon a modification of the point-biserial correlation between an individual's responses and responses of men in the ratings. (For a more detailed description of lambda scales of the NVII, see Dann and Abrahams, 1973).

Like other tools for long-range career planning, the lambda scales of the NVII must show substantial stability over several years if they are to be useful in recruit classification. A man should not be guided into a rating on the basis of scores which are likely to fluctuate from day to day or over short time periods.

In this report, the stability of lambda scores of the NVII will be evaluated over four to six years. Reliabilities will be determined separately for samples of reenlistees and nonreenlistees because previous research (Lau & Abrahams, 1970; Lau & Abrahams, 1971) has indicated that the interests of reenlistees may be more stable than those of nonreenlistees.

The internal consistency reliability of the NVII will also be estimated, although this type of reliability is judged to be of far less relevance than test-retest reliability for the NVII.

PROCEDURE

Instrument

The NVII contains 190 items, each made up of three short descriptions of tasks or activities performed in a wide variety of Navy ratings. An individual indicates his preference for the tasks in each item by choosing the one activity he likes best and the one he likes least. For example, one item on the NVII includes these tasks:

Clemans, W. V. An index of item-criterion relationship. Educational and Psychological Measurement, 1958, 18, 167-172.

Dann, J. E., & Abrahams, N. M. Occupational scales of the Navy Vocational Interest Inventory: I. Development. San Diego: Navy Personnel Research and Development Center, October 1973. (NPRDC Technical Report TR 74-4)

	<u>Like</u>	<u>Dislike</u>
a. Install a telephone.	●	a (D)
b. Make a written report of a month's work.	(L)	b (D)
c. Draw a detailed terrain map.	(L)	c ●

An individual might respond as shown, indicating that he liked activity "a" best and activity "c" least. Or he might choose some other combination of the three alternatives.

The individual's responses are then compared with the responses of men in each of the 15 ratings for which lambda scales are available, and a profile of 15 scores is constructed for each man.

Samples and Method

Test-retest reliability. To estimate the test-retest reliability of the lambda scales, a sample of 1,009 men was located who had not been used in lambda scale construction and who originally completed the NVII in 1964 or 1965 prior to training in one of seven Navy schools (i.e., Electronics Technician (ET), Engineman (EN), Hospital Corpsman (HM), Machinist's Mate (MM), Storekeeper (SK), Yeoman (YN), or Submarine).

Two hundred fifty-five of these men reenlisted or extended their naval service and were mailed NVIIs at their duty stations in 1969. Two hundred eight of the inventories (82 per cent) were returned.

Of the 754 men who did not reenlist, 334 were mailed NVIIs after their home addresses, current as of release from active duty, were found by searching Navy personnel records in 1970. One hundred seventy-four (52 per cent) of these men later returned their materials completed.

After men who had returned incomplete or incorrectly completed NVIIs were eliminated, 179 reenlistees and 136 nonreenlistees remained. The Navy schools attended by these individuals are indicated for descriptive purposes in Table 1.

To estimate the stability of lambda scores of the NVII for these reenlistee and nonreenlistee samples, each individual's total test profile on the 15 scales was correlated with his retest profile on the same 15 scales. One correlation was thus determined for each individual. This method of computing stability was selected over the more traditional method of determining a separate reliability coefficient for each scale for the following reason: An individual's lambda scores are intended for interpretation only in relation to that individual's other scores, with no attempt made to standardize scores in relation to those of some criterion group or groups or to designate in absolute terms what constitutes a "high score." In this context, the rank-ordering of an individual's scores must remain constant if his profile is to retain its meaning over long time periods.

TABLE 1

Number of Reenlistees and Nonreenlistees Who Returned
Complete NVIIs by School Assignment

School assignment	Reenlistees	Nonreenlistees
Electronics Technician	18	21
Engineman	13	14
Hospital Corpsman	17	39
Machinist's Mate	25	8
Storekeeper	7	17
Yeoman	18	18
Submarine	<u>81</u>	<u>19</u>
Total	179	136

Accordingly, each individual's test and retest NVIIs were scored, and the 15 scores of each profile were rank-ordered. Spearman rank difference correlations were computed between each individual's test and retest profiles, and separate distributions of these correlations were determined for reenlistees and nonreenlistees. (A high correlation would indicate close correspondence between the individual's test and retest profiles and a low correlation that the individual's ordering of scores on the two occasions differed considerably.)

Internal consistency reliability. To estimate the lambda scales' internal consistency reliability, a sample of 528 recruits representative of those with whom the NVII would be used operationally was chosen. These men were randomly selected from a much larger sample of recruits administered the NVII at the Naval Training Center, San Diego, over a three month period in 1969.

Each individual was scored on each of the 15 lambda scales once using only the odd-numbered NVII items and a second time using only the even-numbered items. A Pearson product-moment correlation coefficient between odd and even item scores was determined for each of the 15 lambda scales and was corrected using the Spearman-Brown formula to yield an estimate of internal consistency for that scale for the entire test.

RESULTS AND DISCUSSION

Test-Retest Reliability

Table 2 shows grouped frequency distributions of intra-individual test-retest reliabilities for reenlistees and nonreenlistees.

TABLE 2

Intra-Individual Test-Retest Correlations for Reenlistees
and Nonreenlistees Across Lambda Scales
of the NVII

Spearman's Rank Difference Correlation	Reenlistees		Nonreenlistees	
	N	Percentage	N	Percentage
.10 or less	4	2.2	4	2.9
.11 - .20	4	2.2	3	2.2
.21 - .30	6	3.4	2	1.5
.31 - .40	8	4.5	4	2.9
.41 - .50	5	2.8	10	7.4
.51 - .60	6	3.4	7	5.1
.61 - .70	13	7.3	10	7.4
.71 - .80	22	12.3	16	11.8
.81 - .90	40	22.3	22	16.2
.91 - .95	22	12.3	21	15.4
.96 -1.00	49	27.4	37	27.2
Total N	179		136	
Median Correlation	.87		.85	

Among reenlistees, for whom the test-retest interval was four to five years, the median correlation between the original and retest profile was .87. Only 15 per cent of the correlations were .50 or less, while nearly 40 per cent were above .90.

Among nonreenlistees, for whom the test-retest interval was slightly longer (i.e., five to six years), the median test-retest profile correlation was .85. Approximately 17 per cent of this group had correlations of .50 or less, while approximately 43 per cent showed correlations above .90.

Thus, results differed little between reenlistees and nonreenlistees. The correlations indicate substantial stability of lambda score profiles over the time periods considered and are roughly comparable to results obtained by Kuder for the lambda scales of his Occupational Interest Survey (Kuder, 1968).

Internal Consistency Reliability

Table 3 shows uncorrected and corrected odd-even reliability estimates for each of the 15 lambda scales of the NVII.

The corrected reliabilities ranged from .88 to .97, with a median of .96, and indicate high internal consistency for the scales.

TABLE 3
Internal Consistency Reliability of Lambda
Scales of the NVII (N=528)

Lambda scale	Odd-even correlation	With Spearman- Brown correction
QM	.83	.91
ST	.92	.96
ET	.92	.96
RM	.87	.93
DP	.80	.89
SK	.80	.89
CS	.79	.88
EN	.95	.97
BT	.95	.97
EM	.94	.97
EO	.94	.97
AO	.93	.96
AC	.86	.92
AE	.93	.96
HM	.85	.92
Median	.92	.96

Kuder, G. F. Kuder Occupational Interest Survey general manual. Chicago: Science Research Associates, Inc., 1968.

CONCLUSIONS

This study showed median four to six year test-retest reliabilities of .87 and .85 for reenlistees and nonreenlistees for profiles of lambda scales of the NVII. The initial test administration for determining profile stability occurred at about the same time in the mens' Navy careers as if the NVII were being used operationally with recruits, and the test-retest interval was approximately equivalent to the length of a man's first enlistment in the Navy.

The internal consistency reliability of the lambda scales was also very high, with a median of .96 for the 15 scales.

These results indicate the lambda scales of the NVII to be sufficiently reliable for use in recruit classification. However, before scales are recommended for operational use, they must demonstrate other characteristics, such as the ability to discriminate among men in different ratings and to predict such criteria as job satisfaction. Research currently in progress will permit such evaluation of the scales.

REFERENCES

- Abrahams, N. M., Lau, A. W., & Neumann, I. An analysis of the Navy Vocational Interest Inventory as a predictor of school performance and rating assignment. San Diego: U. S. Naval Personnel Research Activity, October 1968. (Research Report SRR 69-11)
- Clark, K. E. The vocational interests of nonprofessional men. Minneapolis: University of Minnesota Press, 1961.
- Clemans, W. V. An index of item-criterion relationship. Educational and Psychological Measurement, 1958, 18, 167-172.
- Dann, J. E., & Abrahams, N. M. Occupational scales of the Navy Vocational Interest Inventory: I. Development. San Diego: Navy Personnel Research and Development Center, October 1973. (NPRDC Technical Report TR 74-4)
- Kuder, G. F. Kuder Occupational Interest Survey general manual. Chicago: Science Research Associates, Inc., 1968.
- Lau, A. W., Lacey, L. A., & Abrahams, N. M. An analysis of the Navy Vocational Interest Inventory as a predictor of career motivation. San Diego: U. S. Naval Personnel Research Activity, June 1969. (Research Report SRR 69-27)
- Lau, A. W., & Abrahams, N. M. Area scales of the Navy Vocational Interest Inventory as predictors of school performance and rating assignment. San Diego: U. S. Naval Personnel Research Activity, July 1969. (Research Report SRR 70-1)
- Lau, A. W., & Abrahams, N. M. The stability of scores on the Navy Vocational Interest Inventory. San Diego: Navy Personnel and Training Research Laboratory, March 1970. (Research Report SRR 70-17)
- Lau, A. W., & Abrahams, N. M. Reliability and predictive validity of the Navy Vocational Interest Inventory. San Diego: Navy Personnel and Training Research Laboratory, February 1971. (Research Report SRR 71-16)

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